

## Physical Workshops

### Active Matter: The Next 25 Years 22 August 2022 Lorentz Center@Oort

#### Scientific

The workshop "Active matter, the next 25 years" took place at the Lorentz Center in Leiden from August 22nd to 26th 2022. The goal of the workshop was twofold: 1) celebrating the 25th anniversary (plus 2 years of Covid) of the physics of active matter; 2) identify the most pressing scientific challenges of this young and then well-established field of research at the interface between soft matter physics, biology, chemistry and applied mathematics. Both goals have been met. The second goal, in particular, will lead to a deliverable outcome in the form of a perspective article that will be published, in a time scale of one year, in Physical Review Research, the new online journal of the American Physical Society.

The terminology "active matter" denotes a broad and heterogeneous class of physical systems whose building blocks can autonomously move or generate mechanical work. Whereas the interest around these systems has a longstanding history in science, it is only in 1995 that, thanks to the pioneering work of Vicsek, Toner and Tu, these topics finally entered in the realm of theoretical and later experimental physics.

Twenty five years later, active matter has evolved into one of the most vibrant and productive areas of physics, with hundreds of articles published every year. Furthermore, whereas the paradigm of active matter was initially introduced as a toy model for collective motion in animals, it has now developed into a comprehensive theoretical and experimental framework, able to portray a surprisingly broad class of living and non-living systems across length scales: from flocks of starlings, down to self-propelled colloidal particles, bacterial colonies, collective cell migration in epithelia, the cell cytoskeleton and synthetic materials.

#### Organization

The program of the workshop was thematically structured, with every day of the week devoted to a specific research theme. The themes themselves were decided by the organisers only after collecting the titles of the presentations, with this specific purpose of identifying what the community perceived as most interesting and urgent. Unfortunately, a train strike on Friday, forced us to anticipate half of the presentations scheduled on Friday and this resulted into a tight daily schedule. Because of the emphasis on identifying the most important research questions for the years to come, the participants had been asked to pay little attention to giving polished and well crafted presentations, but to focus instead on recent and possibly unpublished results. The majority of the participants accepted the challenge and this helped creating a lively and interactive atmosphere.

As part of the initiative of the workshop, and taking advantage of the fact that Leiden was in 2022 the European City of Science, we organised a public lecture at the Museum Volkenkunde. The lecture, mainly delivered by co-organizer and active matter pioneer Cristina Marchetti with a 10 minutes introduction by the local host Luca Giomi, had been attended by nearly 150 people and received media coverage on NRC

(<https://eur03.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.nrc.nl%2Fnieuws%2F2022%2F10%2F07%2Fde-fysica-van-krioelen-a4144194&data=05%7C01%7Cbleize%40lorentzcenter.nl%7C68efbee4598f479d16ea08dab79a2047%7Cca2a7f76dbd74ec091086b3d524fb7c8%7C0%7C0%7C638024170628039386%7CUnknown%7CTWFpbGZsb3d8eyJWljojMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikl1haWwiLCJXVCi6Mn0%3D%7C3000%7C%7C&data=dUC1mpOqi4kMsUIMlxNVR2wzOY0JOO78Z8n87l4oCbs%3D&reserved=0>).

Overall, the workshop was successful and allowed many talented researchers operating in the field to reconnect with their community after two years of isolation and intellectual struggle. The latter was, in the opinion of the organizers, the most important achievement of the workshop.

**Luca Giomi** (Leiden, the Netherlands)

**Cristina Marchetti** (Santa Barbara, USA)

**Anupam Sengupta** (Luxembourg)

**Cecile Cottin-Bizonne** (Lyon, France)